You may wish to save this foldout for future reference or use it as a wall chart. Pull gently at the edge and rub off the removable glue. If the foldout has been removed, a limited number of additional copies are available. Check the appropriate box on the reader service card.

Completely new Dynamic Data Manager® and Transient Data Manager™ Software products

The last **Orbit** introduced our new Dynamic Data Manager® 2 (DDM2) and Transient Data Manager® 2 (TDM2) Software for on-line, computerized machine condition monitoring. The number 2 in each name indicates the second generation for these software packages. This article highlights the differences between our original (first generation) DDM/TDM Software and the new DDM2/TDM2 Software. It is written for those of you who are already familiar with, and/or currently use, our first generation DDM/TDM Systems.

Should you upgrade your existing DDM/TDM System to the new software? Because of the many enhancements available with the new products, we believe you should. As an incentive, until the end of 1992, we are offering existing customers **a substantial discount** on upgrades from DDM to DDM2 or from TDM to TDM2. Contact your local Bently Nevada representative for details on our software upgrade program.

Why introduce a second generation product?

The answer to this question is based on two factors — **(1) what we wanted the new software to do and (2) what we recognized as a basic limitation of the first generation software.**

We knew we wanted the new software to have some communications capabilities outside of a single computer (stand-alone) system. We also knew it would take a multi-tasking computer system to perform these functions, specifically networking and remote (modem) communications.

The second factor is a basic limitation of the first generation software, the DOS operating system. DOS is a **single-tasking** operating system. It can execute only one computer instruction set at a time. Even computer operating systems that **appear** to be multi-tasking, like Windows®, are **not really** multi-tasking. They can "open" multiple files and programs at once, and it may appear that all of these are operating at the same time, but such is not the case. In this arrangement, DOS still does only one instruction at a time, although it jumps back and forth between programs or files as though several tasks are being executed simultaneously.

Windows® is a Registered Trademark of Microsoft Corporation

For our new system, we chose QNX. **This operating system is specifically designed for multi-tasking and multi-user environments.**

Another justification for a new software product is a result of our enhanced 3300 Monitoring System. We enhanced the resolution and quantity of data available at the **Serial Data Interface (SDI).** SDI is a communications port for connection to digital control systems, programmable logic controllers, etc., via industry standard protocols.

We also designed a DDM communications processor into the 3300 rack, as an option in the System Monitor. In a►

similar manner, we enhanced the data available to the **Bently Nevada computer interface** for Dynamic Data Manager® Systems. This option is called the **Dynamic Data Interface** (DDI). For example, data from the DDI includes greater resolution for Shaft Centerline (probe dc gap) and Spectrum plots. DDI Spectrum plots now have 400 lines of resolution. A significant revision of the original DDM Software would have been required to take advantage of this new data. Instead, we have designed the new DDM2 Software to accommodate this additional data.

Remote (modem) data communications

The most requested enhancement to the original DDM/TDM Software was remote communications via telephone modem. This has been added to both DDM2 and TDM2 Software. An **on-site computer** is connected to, and collects data from, communications processors, monitor racks and transducers. It will operate the **Data Acquisition** and/or the **On-site Display** (or both) DDM2 or TDM2 Software modules. Both of these modules have a remote, built-in communications package.

The on-site computer can be accessed via telephone modem from another computer at the same plant site, another site, or even another country. The remote computer needs only the **Remote Display** DDM2 or TDM2 Software module, a plug-in remote communications card, and a modem. The same displays available at the on-site computer are also available at the remote computer.

"The most customer-requested enhancement to the original DDM/TDM Software was remote communications via telephone modem. This has been added to both DDM2 and TDM2 Software."

A unique feature of our system is the ability to have the remote computer notified **automatically** upon a monitor alarm event. The configuration program for the on-site computer has an option to include a telephone number that will be dialed automatically in the event of a monitor alarm. If the remote computer is operating DDM2 or TDM2 Software at that time, a **pop-up window** will appear on the remote computer screen, indicating an on-site alarm. If the remote computer is running another application program, or if it is not even turned on when the alarm event occurs, the on-site computer can be set up to continue dialing the remote telephone number until a connection is established.

If the remote computer is close to the on-site computer, **a modem and telephone line may not be necessary.** Our remote communications software also will support a direct cable, hardwired connection. RS-422 cable can be used **(up to 4000 feet or 1200 metres)** to link on-site and remote computers. (The same remote communications card is still required for both computers.)

Network communications

We incorporated networking into DDM2/TDM2 Software to satisfy several different customer applications. We chose Ethernet because it is the most commonly used network topology, worldwide. Our system can include up to ten DDM2/TDM2 computers networked together via any of the three types of Ethernet cabling — ThinNet, Thicknet (standard Ethernet) and/or fiber optic. Both DDM2 and TDM2 computer systems can exist on the same network.

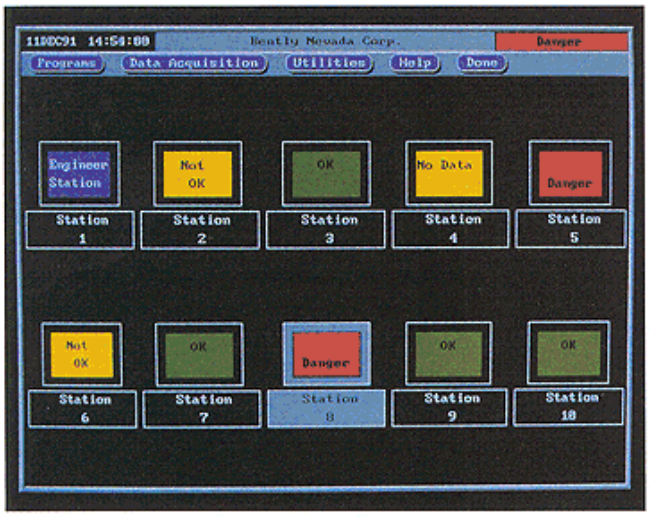

Figure 1

The top level menu screen is the plant display. It shows the status of up to ten TDM2 or DDM2 computer network stations. A pull-down menu environment allows users to select data from any of the ten systems for display on any station on the network.

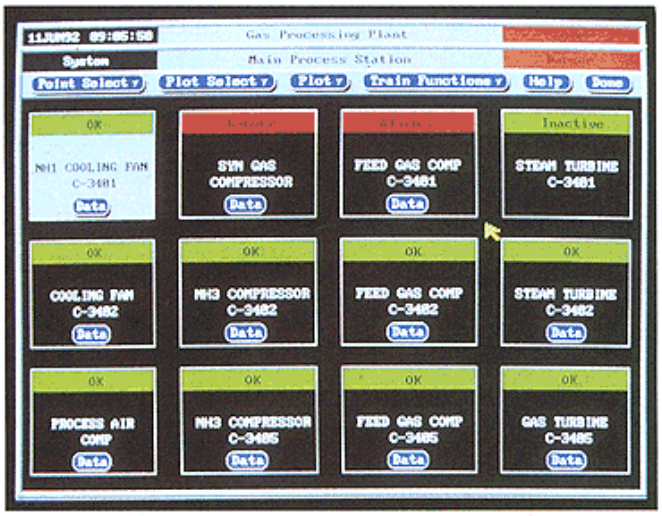

Figure 2

The Station Display shows the status of up to 12 machines connected to one data acquisition computer.

The most common application for networking is when one or more data display "terminals" are required at an on-site location. In a DDM2/TDM2 network system, the terminals are called **engineering workstations**. These are standard computers, supplied only with the On-site Display DDM2 or TDM2 Software module. If there is only one DDM2/TDM2 data acquisition computer at the site, then there can be up to nine engineering workstations on the same network. All of the screen displays available at the data acquisition computer are also available at the engineering workstation(s).

Perhaps the data acquisition computer is at an **unmanned location**, and the data must be displayed at **another** location. In this case, the data acquisition computer needs only the DDM2 or TDM2 Data Acquisition Software module and is networked to an engineering workstation(s). If the data acquisition site is **never** manned, that computer does not even need a keyboard or monitor; it can operate as a "blind" computer system.

With our first generation software, a stand-alone DDM or TDM computer was limited to 12 monitor racks and/or communications processors. If a plant site had more than 12 racks, a second DDM or TDM computer had to be added and also had to be a stand-alone system. With DDM2/TDM2 networking capability, two or more (up to 10) data acquisition computers can be tied together. **This expands the capacity of the complete system from 12 racks to 120 racks!** For computers that have On-site Display Software, you can view data from any of the data acquisition computers.

"We incorporated networking into DDM2/TDM2 Software to satisfy several different customer applications. Our system can include up to ten DDM2/TDM2 computers networked together..."

Now it should be apparent why we developed DDM2/TDM2 Software in three separate modules. **Only the module(s) required for each individual computer's application must be purchased and installed.** Some computers may be used for data acquisition only, some for display only and others may require both data acquisition and display. The third software module is Remote Display, required only by the remote computer. A DDM2/TDM2 network will support up to two separate remote computers, each linked to a separate on-site computer.

If Ethernet cable is already installed at a plant site for other network communications, DDM2/TDM2 computer systems can be added to that network by simply installing additional cabling and connectors. DDM2/TDM2 Software will operate independently of any software used by other (non-DDM2/TDM2) computers on the network.

Mouse-driven windows environment

Computer programs that require a significant amount of text and/or numerical input must be run on a keyboard-driven computer. Such programs include word processing, spreadsheets, and database management. However, programs that run by single keystrokes (e.g., choices from a menu) are most efficiently run if the software is designed for use with a mouse. DDM2/TDM2 is such a program.

The DDM2/TDM2 **configuration** program requires some keyboard input►

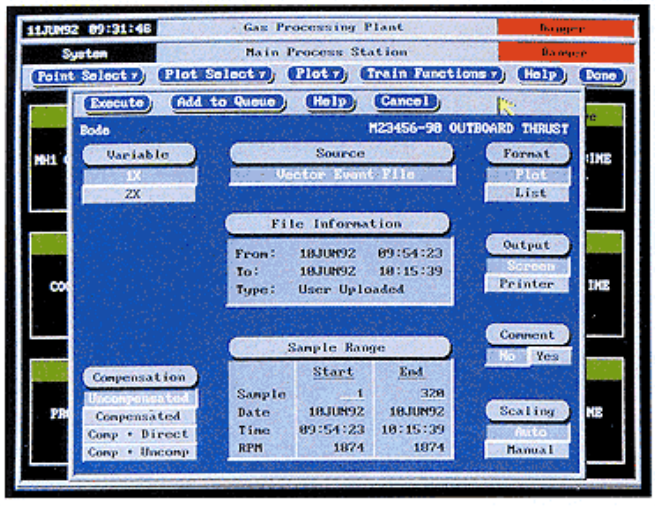

Figure 3
Extensive use has been made of pop-up windows. This screen allows the user to select options for a Bode plot.

Figure 4
Dynamic data plots include Polar, Bode (Figure 3), Cascade, Orbit/Timebase and Spectrum.

— meter scales, units of measurement, etc. However, once the on-line program is operating, selections are made from a main menu bar or from secondary menus that appear as pop-up windows. Selections from all menus are made by the **simple click of the mouse button.**

Intelligent input/output and high speed modems

Significant use has been made of intelligent or "smart" computer plug-in cards. For both data acquisition (from monitor racks) and remote computer communications, we have specified smart I/O cards that have a microprocessor and local memory so that data transfer can be as efficient as possible.

For example, with a standard I/O card for modem communications, the computer CPU (central processing unit) is interrupted with virtually **every byte** of transferred data. With a smart card, data is accumulated in **blocks** and then transferred at a much faster rate. This leaves the CPU free to attend to other tasks.

We have also specified **9600 baud** modems, the fastest modems in common use today. In the future, we may be able to accommodate even faster modem communications.

User-selectable trend intervals

Another common suggestion from our DDM/TDM customers concerned the sample intervals and length of our trend files. With DDM/TDM there was no choice. The sample interval was 20 minutes and there were four trend files — 1 day, 1 week, 4 weeks and 12 weeks.

With DDM2/TDM2, there is a configuration option with **four different sample intervals** and corresponding trend file lengths. The shortest sample interval is 10 minutes, with additional choices of 20 minutes, 1 hour and 2 hours. Using the 10 minute sample interval, the trend file lengths are 12 hours, 3.5 days, 2 weeks and 6 weeks. The slowest sample interval is 2 hours, producing trend file lengths of 1 week, 4 weeks, 26 weeks and 1 year.

"We have significantly enlarged the capacity of the system to store various types of data files... DDM2/TDM2 now allow up to 50 Alarm Dynamic Data files to be stored..."

More data on hard disk

We have significantly enlarged the capacity of the system to store various types of data files. DDM/TDM allowed only eight Alarm Dynamic Data files per rack or machine train. DDM2/TDM2 now allow **up to 50 Alarm Dynamic Data files** to be stored. With TDM2, **up to 50 transient (startup or coastdown) files** can be stored for each machine train, compared to only one with original TDM.

DDM/TDM allowed only one dynamic data file to be stored for each channel in the system. This file could then be used as baseline data for future comparison with current dynamic data. DDM2/TDM2 allows **one file for baseline reference and also one file for Engineer Assist** (our new expert system software). Also, any of the 50 files available for transient data can be used for storing current or reference dynamic data. When a transient data file is used for storing current or reference data, the complete Fast Trend file is stored. This represents 320 static data samples and 32 waveform samples.

Alarm Event and System Event Lists were limited to 100 entries in DDM/TDM Software, and the first 50 entries in each list were normally not overwritten. DDM2/TDM2 Software allows 400 entries in each list, and all 400 can be overwritten.

External cartridge drive

The original software was designed to use the computer's floppy disk drive(s) as the only medium for library data storage. Of course, this limited the data storage capacity to 1.44 M bytes (for 3.5 inch diskettes). For DDM2/TDM2, we have added a much higher capacity storage medium, an external cartridge drive.

The external drive accepts a removable cartridge with a **capacity of 44 M bytes**. Actually, the cartridge contains a hard "platter" rather than a floppy disk. We decided on this storage medium because of its greater capacity and greater reliability in industrial environments.

Context-sensitive on-line user manual

DDM2/TDM2 Software is supplied with a hard copy User Manual that contains information on system installation and other system considerations. The **User Manual, which describes the operation of the software, is built into the software.** From any screen, when the mouse clicks on the Help button, part of the on-line manual is presented as a pop-up window.

The window includes text associated with the screen from which the Help button was selected. A mouse cursor bar is also part of the window so that the user can scroll through the complete manual line by line or page by page. Of course, if a hardcopy is desired, the on-line manual can be printed in its entirety or page by page.

Other enhancements

DDM2/TDM2 Software contains other enhancements over the original DDM/TDM, but there is insufficient space to discuss them here. They include support of an HP Laserjet printer, ability to assign more dynamic channels (50 total) per machine train, two Acceptance Regions per plot, and several other features. Please contact your nearest Bently Nevada representative for complete information on, and a demonstration of, DDM2/TDM2 Software. ■